

Investigation of the Grounds for Newborn Intramuscular Vitamin K Refusal among Mothers in Türkiye: A Case-Control Study

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Abstract

Aim

Refusal of intramuscular (IM) vitamin K administration, given prophylactically to prevent vitamin K deficiency bleeding, has become increasingly common alongside the growing tendency toward vaccine refusal. This study aimed to determine the reasons mothers refuse IM vitamin K administration for their newborns and to identify factors associated with refusal among mothers who accepted or declined IM vitamin K.

Materials and Methods

A case–control design was employed. The case group consisted of mothers with infants aged ≤ 2 years who refused IM vitamin K administration, while the control group included mothers who accepted IM vitamin K for their infants. A 1:2 ratio was applied between cases and controls, resulting in 74 cases and 148 controls. The study was conducted between March 2023 and June 2025. Data were analyzed using the independent samples t-test, Pearson's chi-square test, and binary logistic regression to examine relationships between variables associated with IM vitamin K administration.

Results

Approximately one-third (32.4%) of mothers who refused IM vitamin K received antenatal care at public healthcare facilities (midwives in family health centers and healthcare staff in state hospitals). Binary logistic regression analysis revealed that IM vitamin K refusal was more common among mothers who also refused neonatal prophylactic eye drops; expressed concerns about the content of vitamin K; exclusively breastfed their babies for the first six months; did not take their infants for follow-up examinations; did not use iron supplements during pregnancy; and did not undergo a double screening test ($p < .05$). The main reasons for refusal of newborn IM vitamin K were distrust and doubt, the perception that IM vitamin K is unnecessary, naturalistic or alternative beliefs, religious and cultural factors, lack of knowledge, and uncertainty.

Conclusion and Recommendations

Naturalistic and alternative treatment approaches appear to be important factors influencing maternal refusal of IM vitamin K. During antenatal care and infant–child follow-up visits, healthcare providers should address IM vitamin K refusal, along with vaccine hesitancy, through targeted education and communication with families.

Introduction

Vitamin K is essential for the hepatic synthesis of coagulation factors [1]. The mortality risk associated with bleeding due to vitamin K deficiency increases when the bleeding occurs later, typically between 2 weeks and 6 months after birth. The mortality rate among infants with vitamin K deficiency bleeding

(VKDB) ranges from 14% to 50% [1]. It has been reported that mothers of infants with VKDB may have conditions such as Crohn's disease or may use antibiotics or anticoagulants, which alter the infant's intestinal flora and interfere with coagulation mechanisms [2].

The American Academy of Pediatrics (1961) and the Turkish Neonatology Society (2021) recommend intramuscular (IM) vitamin K prophylaxis for all newborns to prevent VKDB [3, 4]. Although the routine administration of vitamin K at birth has achieved significant success in preventing VKDB as part of national preventive health services, supported by the Scientific Committee of the Ministry of Health (2021) [5], recent years have witnessed a rise in both VKDB incidence and parental refusal of IM vitamin K [6, 7].

According to a meta-analysis, the global prevalence of vitamin K refusal is 1.1% [8]. In the United States, refusal increased from 0.9% to 1.6% among infants born between 2015 and 2019 [9]. In Scotland, the rate is 0.9% [10], while in Australia, it is approximately 2% [11]. The incidence of IM vitamin K refusal in Türkiye remains unknown. However, since both vaccine refusal and IM vitamin K refusal often occur in parallel, and vaccine hesitancy has been rising sharply in Türkiye, it is reasonable to infer that vitamin K refusal may also be increasing. A case report of late-onset VKDB conducted in Türkiye by Unal et al. [12] and data from 48 observational studies indicated that 42% of 534 infants had not received vitamin K prophylaxis.

According to the literature, the likelihood of vitamin K refusal is higher among mothers who deliver at home with the assistance of a midwife, have high parity, are older than 30 years, exclusively breastfeed for an extended period, hold a university degree, or give birth to a female infant. Moreover, refusal is reported more frequently among mothers who give birth in private birthing centers [9, 13].

Many parents express general concerns and hesitancy about preventive interventions for their infants before and after birth. Multiple factors influence the parental decision-making process, leading some to decline IM vitamin K prophylaxis [14]. Furthermore, refusal of vitamin K is associated with an increased likelihood of declining other newborn preventive health services, including newborn screening tests, prophylactic 0.5% erythromycin administration at birth, the hepatitis B vaccine, and vitamin D and iron supplementation [8].

In a qualitative study conducted by Loyal et al. [14], four main themes were identified in parents' decision-making processes regarding IM vitamin K administration. These themes included parents' perceptions of risk; their preference for "natural" or alternative options; their levels of trust and distrust (toward healthcare institutions, the pharmaceutical industry, their social networks, healthcare professionals, both allopathic and non-allopathic providers, and online sources such as the internet and social media), and their communication and experiences with healthcare providers. Similarly, the reasons underlying parental refusal of vitamin K have been categorized into three major domains: parental beliefs (philosophical or spiritual), concerns about the newborn's health (pain or potential side effects), and external influences (family, friends, or social media) [15].

Negative parental attitudes that support vitamin K refusal tend to increase the prevalence of incomplete or inaccurate knowledge. Few studies have investigated the causes and risk factors associated with vitamin K refusal among families in Türkiye. The present study hypothesizes that refusal of vitamin K may be more common among families who favor alternative or natural health practices, exhibit vaccine hesitancy, and reject other preventive measures administered at birth. To protect newborn health, families who refuse vitamin K should be monitored both locally and nationally, the underlying reasons for refusal should be identified, and strategies should be developed to promote acceptance of vitamin K injections. Accordingly, to improve newborn health outcomes, it is essential to understand maternal perspectives on vitamin K refusal and to formulate policies for systematic monitoring.

This study, therefore, aimed to determine mothers' reasons for refusing IM vitamin K administration for their infants after birth and to identify factors associated with acceptance or refusal of IM vitamin K among mothers.

MATERIALS AND METHODS

This study employed a case–control design and adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement checklist. The case group comprised mothers with infants aged ≤ 2 years who refused IM vitamin K administration, while the control group included mothers who accepted IM vitamin K administration for their infants.

The sample size for the case group was calculated as 70 participants using OpenEpi© software, based on a maximum vitamin K refusal prevalence of 0.3%, an absolute deviation of 1%, and a 95% confidence level. Applying a 1:2 case–control ratio, the final sample included 74 cases and 148 controls. Controls were matched with cases according to maternal age, region of residence, and education level. Case selection was conducted using the snowball sampling method, one of the purposive sampling techniques.

The dependent variable of the study was refusal of the IM vitamin K injection. Independent variables included sociodemographic characteristics, obstetric characteristics, breastfeeding practices, preventive care behaviors, screening status, and mothers' reasons for refusing IM vitamin K administration.

Inclusion and Exclusion Criteria

The study included mothers who were ≥ 18 years of age, had infants aged 0–24 months, were literate and able to communicate effectively, and volunteered to participate. The case group comprised mothers who refused IM vitamin K administration for their newborns. The control group consisted of mothers matched with the cases who accepted IM vitamin K administration for their infants. Mothers who submitted incomplete questionnaires or had infants older than 24 months were excluded. Additionally, cases were excluded if they did not provide a reason for refusing IM vitamin K administration.

Data Collection Tools

Data were collected using a researcher-developed questionnaire based on a literature review [14, 16]. The instrument consisted of two sections: a Descriptive Data Form and an IM Vitamin K Refusal Form.

The Descriptive Data Form included questions about the mothers' sociodemographic characteristics (age, education, occupation, income, and family type); pregnancy, birth, and postpartum characteristics (the infant's gender and age, number of pregnancies, number of living children, whether the pregnancy was planned, gestational age, institution where the pregnancy was followed up, institution where the child was delivered, mode of delivery, birth and postpartum health problems, vaccinations, screenings, and supplements used during pregnancy); breastfeeding and feeding habits; administration of preventive practices and screenings to the infant (eye care and hepatitis vaccination, heel prick, vitamin D, and iron supplement use at birth); following anti-vaccine and natural birth philosophy groups on social media; use of alternative medical practices; and delay or refusal to receive pediatric vaccines (if applicable, open-ended responses were encouraged).

The IM vitamin K refusal form included open-ended questions addressing reasons for refusing IM vitamin K administration, participants' awareness of the purpose of IM vitamin K, sources of information about IM vitamin K (multiple responses allowed), whether participants were informed about IM vitamin K at birth, and whether they had any concerns about the content of vitamin K.

Mothers were asked open-ended questions about their concerns related to the vitamin K formulation. Responses were analyzed thematically, and a word cloud illustrating theme frequencies was created using MAXQDA software.

Data Collection

Snowball sampling was employed to recruit participants for the case group. This approach was chosen for two main reasons. First, in the region where the researchers were located, only five cases of IM vitamin K refusal were identified among 6,800 births in one year, making it difficult to reach a sufficient number of eligible participants. Therefore, snowball sampling was deemed the most appropriate method. The initial participants were several families who refused vitamin K administration and were contacted through social media groups, freelance midwives, and private midwives. Control participants were selected from the same regions and provinces to ensure standardization. Data were collected through a Google Forms survey, which participants accessed via freelance and private midwives and relevant social media groups. Data collection took place between March 2023 and June 2025, and completion of the questionnaire required approximately 10–15 minutes.

Ethical Approval

This study was conducted in accordance with the principles of the Declaration of Helsinki of the World Medical Association. Ethical approval was obtained from the Balıkesir University Health Sciences Non-

Interventional Ethics Committee (Date: February 7, 2023; Approval No: 2023/9).

All participants provided informed consent electronically by selecting the “I Consent to Participate in the Study” option on the online form, indicating that they had read, understood, and voluntarily agreed to participate.

Statistical Analyses

Statistical analyses were performed using IBM SPSS Statistics version 30 (IBM Corp., Armonk, NY, USA). Quantitative variables were summarized as means, standard deviations, medians, and minimum–maximum values, while qualitative variables were presented as frequencies and percentages using descriptive statistical methods. To descriptively determine mothers’ reasons for refusing newborn IM vitamin K administration, the distribution of themes and subthemes was evaluated as numbers and percentages.

Pearson’s chi-square analysis was used to examine relationships between sociodemographic, obstetric, breastfeeding, social media use, vaccination status, and IM vitamin K administration variables in the case and control groups. Binary logistic regression analysis was conducted for multivariate modeling to determine the effect, direction, and magnitude of factors associated with IM vitamin K refusal.

Model selection was based on the Akaike Information Criterion (AIC), with the model showing the lowest AIC value selected as the best fit. The following independent variables were included in the binary logistic regression model: prophylactic eye drop administration, vitamin D use, exclusive breastfeeding for the first six months, delay in vaccine administration, concerns about vitamin K content, use of alternative health practices, tetanus vaccination during pregnancy, folic acid use during pregnancy, screening and testing during pregnancy, infant monitoring or follow-up, iron supplement use during pregnancy, undergoing a double screening test during pregnancy, and maternal employment status.

Odds ratios (ORs) with 95% confidence intervals (CIs) were reported. The type I error level was set at $\alpha = .05$.

RESULTS

Table 1. Relationship between sociodemographic characteristics of mothers who refused IM vitamin K administration and those who accepted it

Variables	Refusing IM vitamin K administration	Accepting IM vitamin K administration	OR(%95 GA)	P
	n(%) / Mean(SD)	n(%) / Mean(SD)		
<i>Employment status of the mother</i>				
Unemployed-Housewife	46(39.3)	71(60.7)	1.78(1.01-3.15)	0.046
Employed	28(26.7)	77(73.3)		
<i>The infant's gender</i>				
Male	30(28.8)	74(71.2)	1.46(0.83-2.58)	0.183
Female	44(37.3)	74(62.7)		
<i>The infant's age (month)</i>	15.20±16.23	14.53±11.20		0.750
<i>Income (Turkish Currency)</i>	60608.10±36523.89	73727.88±42459.42		0.018
<i>Parity</i>				
1	28(26.7)	77(73.3)	0.56(0.31-0.99)	0.046
≥2	46(39.3)	71(60.7)		
<i>Number of births</i>				
1	34(26.8)	93 (73.2)	0.50(0.28-0.88)	0.016
≥2	40(42.1)	55(57.9)		
<i>Having a planned pregnancy</i>				
Yes	58(31.7)	125(68.3)	0.66(0.32-1.35)	0.262
No	16(41.0)	23 (59.0)		
<i>Mode of delivery</i>				
Normal	33 (37.5)	55(62.5)		
Caesarean section	39(30.5)	89(69.5)		0.561
Interventional birth	2(33.3)	4(66.7)		
<i>Gestational age</i>	38.41(1.91)	38.04(3.51)		0.318
<i>Complications during birth</i>				

Yes	10(28.6)	25(71.4)	1.30(0.58-2.87)	0.515
No	64(34.2)	123(65.8)		
<i>Postpartum complications</i>				
Yes	8(33.3)	16 (66.7)	1.00	1.00(0.40-2.45)
No	66 (33.3)	132(66.7)		

The relationship between the sociodemographic characteristics of mothers who refused IM vitamin K administration and those who accepted it is presented in Table 1.

The risk of IM vitamin K refusal was 1.78 times higher among unemployed housewives compared to employed mothers ($p = .046$). The mean family income of mothers who refused IM vitamin K (₱60,608.10 \pm 36,523.89) was lower than that of mothers who accepted it (₱73,727.88 \pm 42,459.42), and this difference was statistically significant ($p = .018$).

Mothers in their first pregnancy had a 0.56 times lower risk of refusing IM vitamin K (95% CI: 0.31–0.99, $p = .046$), and primiparous mothers had a 0.50 times lower risk (95% CI: 0.28–0.88, $p = .016$). No significant relationships were observed between IM vitamin K refusal and the infant’s gender and age, whether the pregnancy was planned, mode of delivery, gestational age, or complications during and after birth.

Table 2. Relationship between the use of preventive practices during and after birth in mothers who approved and those who refused IM vitamin K administraton

Variables	Refusing IM vitamin K administration	Accepting IM vitamin K administration	OR(%95 GA)	p
<i>Receiving a Hepatitis B vaccine in the delivery room</i>				
Refusal	65(90.3)	7(9.7)	15.04(7.95-28.47)	<0.001
Approval	9(6.0)	141 (94.0)		
<i>Having eye care in the delivery room (0.3% gentamicin. 0.3% tobramycin)</i>				
No	35 (64.8)	19(35.2)	6.09(3.13-11.83)	<0.001
Yes	39(23.2)	129(76.8)		
<i>Heel prick blood collection</i>				
No	32 (100.0)	0(0.0)	4.52(3.46-5.90)	<0.001
Yes	42(22.1)	148(77.9)		
<i>Using Vitamin D</i>				
No	36(76.6)	11(23.4)	11.79(5.49-25.35)	<0.001
Yes	38(21.7)	137(78.3)		
<i>Using iron drops</i>				
No	58 (51.3)	55(48.7)	6.13(3.21-11.69)	<0.001
Yes	16(14.7)	93(85.3)		
<i>Exclusive breastfeeding for the first 6 months</i>				
Yes	70 (38.0)	114(62.0)	5.21(1.77-15.33)	0.001
No	4(10.5)	34(89.5)		
<i>Feeding of the baby</i>				
Exclusive breastfeeding	36(58.1)	26(41.9)		
Breast milk and complementary foods	30(26.3)	84(73.7)		<0.001
Only complementary foods	8(17.4)	38(82.6)		
<i>Delayed vaccination</i>				

Yes	36(51.4)	34(48.6)	3.17(1.75-5.76)	<0.001
No	38(25.0)	114(75.0)		
<i>Vaccine refusal</i>				
Yes	56(61.5)	35(38.5)	10.04(5.23-19.28)	<0.001
No	18(13.7)	113(86.3)		
Having the follow-up of the infant at a health institution				
Followed up in a healthcare facility	58(28.9%)	143(71.1%)	0.12(0.04-0.36)	<0.001
No follow-up in any healthcare facility	16(76.2%)	5(23.8%)		

The relationship between the use of preventive practices during and after birth among mothers who accepted and those who refused IM vitamin K administration is presented in Table 2.

The rate of IM vitamin K refusal was significantly higher among mothers who refused hepatitis B vaccination and neonatal eye prophylaxis and those who did not take their infants for follow-up at a healthcare facility ($p < .001$). Similarly, refusal of IM vitamin K was more common among infants whose mothers declined heel-prick screening for diseases included in the Neonatal Screening Program (phenylketonuria, congenital hypothyroidism, cystic fibrosis, biotinidase deficiency, congenital adrenal hyperplasia, and spinal muscular atrophy), refused prophylactic vitamin D beginning on the 15th day, refused prophylactic iron supplementation at the fourth month, or delayed or refused routine vaccinations ($p < .001$).

Conversely, IM vitamin K administration was significantly more frequent among mothers who exclusively breastfed their infants for the first six months and those who maintained long-term breastfeeding ($p < .001$).

Table 3. Relationship between some variables and the vitamin K knowledge of mothers who accepted and those who refused IM vitamin K administration

Variables	Refusing IM vitamin K administration	Accepting IM vitamin K administration	OR (%95 GA)	p
<i>Having concerns about the content of Vitamin K?</i>				
No	5(7.9)	58(92.1)		
Yes	51(70.8)	21(29.2)		<0.001
No idea/undecided	18(20.7)	69(79.3)		
<i>Knowing why vitamin K is administered</i>				
Yes	62 (42.8)	83(57.2)	4.04(2.01-8.13)	<0.001
No	12(15.6)	65(84.4)		
<i>Having received information about the administration of vitamin K</i>				
Yes	46(52.3)	42(47.7)		
No	26(21.7)	94(78.3)		<0.001
Cannot remember	2(14.3)	12(85.7)		
<i>Following anti-vaccine groups</i>				
Yes	48(53.9)	41(46.1)	4.81(2.65-8.76)	<0.001
No	26(19.5)	107(80.5)		
<i>Believing/following the philosophy of natural birth</i>				
Yes	52(44.1)	66(55.9)	2.93(1.62-5.32)	<0.001
No	22(21.2)	82(78.8)		
<i>Using traditional complementary medicine practices</i>				
Yes	62(47.0)	70(53.0)	5.75(2.86-11.56)	<0.001
No	12(13.3)	78(86.7)		

The relationship between selected variables and the vitamin K knowledge of mothers who accepted or refused IM vitamin K administration is presented in Table 3.

IM vitamin K refusal was significantly higher among mothers who expressed concerns about the content of vitamin K, who reported having received information about and understanding the purpose of IM vitamin K administration, who followed anti-vaccine groups, who endorsed or followed natural birth philosophies, and who used traditional or complementary medicine practices ($p < .001$).

Table 4. Relationships between IM vitamin K refusal and routine screening and vitamin use during pregnancy

Variables	Refusing IM vitamin K administration	Accepting IM vitamin K administration	OR (%95 GA)	p
<i>Using iron preparations</i>				
No	28(36.8%)	48(63.2%)	1.26 (0.70-2.27)	0.424
Yes	46(31.5)	100(68.5%)		
<i>Having double/triple screening tests</i>				
No	41(44.6%)	51(55.4%)	2.36(1.33-4.17)	0.003
Yes	33(25.4%)	97(74.6%)		
<i>Using vitamin D</i>				
No	36(39.6%)	55(60.4%)	1.61(0.91-2.81)	0.101
Yes	38(29.0%)	93(71.0%)		
<i>Getting a tetanus injection</i>				
No	44(42.7%)	59(57.3%)	2.21(1.25-3.90)	0.006
Yes	30(25.2%)	89(74.8%)		
<i>Using folic acid</i>				
No	30 (43.5%)	39(56.5%)	1.90(1.05-3.41)	0.031
Yes	44(28.8%)	109(71.2%)		
<i>Having an Oral Glucose Tolerance Test</i>				
No	54(40.0)	81(60.0)	2.23(1.21-4.09)	0.009
Yes	20(23.0%)	67(77.0)		
Having the tests or using the measures				
Those who had/used at least one	59(30.1)	137(69.9)	0.31(0.13-0.72)	0.005
Those who did not have any screening	15(57.7)	11(42.3)		

The relationship between prenatal screenings and vitamin use among mothers who accepted and those who refused IM vitamin K administration is presented in Table 4.

IM vitamin K refusal was significantly more frequent among mothers who did not undergo double or triple screening tests, did not receive tetanus vaccination, did not use folic acid, did not complete an oral glucose tolerance test (OGTT), and did not undergo any screening during pregnancy ($p < .05$) (Table 4).

Table 5. Distribution of mothers according to the institution where they received antenatal follow-up and the institution where they gave birth

<i>Institution where antenatal follow-up was performed</i>	Refusing IM vitamin K administration	Accepting IM vitamin K administration
	<i>n(%)</i>	<i>n(%)</i>
Family medicine - by a midwife	2(2.7)	23 (15.5)
Family medicine - by a midwife - in a state hospital	24(32.4)	22(14.9)
Family medicine - by a midwife - in a private hospital	11(14.9)	20(15.3).
Family medicine - by a midwife - in a university hospital	2(2.7)	5(3.4)
In a state hospital	9(12.2)	21(14.2)
In a state hospital and a private hospital	6(8.1)	7(4.7)
In a private hospital	19(25.7)	42(2.84)
By a freelance midwife	1 (1.4)	0(0.0)
In a university hospital	0(0.0)	8(5.4)
<i>Institution where birth took place</i>		
In a state hospital	18(24.3)	33 (22.3)
In a university hospital/training and research hospital	12(16.2)	34(23.0)
In a private hospital	38(51.4)	79(53.4)
At home with a trained midwife	6(8.1)	2(1.4)

A detailed analysis of the healthcare institutions where antenatal follow-up was conducted among mothers who refused IM vitamin K administration revealed that approximately one-third (32.4%) received follow-up care both from midwives in family medicine centers and in state hospitals. This was followed by private hospitals and combined care provided by family medicine midwives and private hospitals,

respectively. In contrast, among mothers who accepted IM vitamin K administration, the primary institution for antenatal follow-up was family medicine centers, where care was provided by midwives (15.5%) (Table 5).

Table 6. Distribution of themes and subthemes regarding the reasons for mothers' refusal of IM neonatal vitamin K administration (n=74)

Main themes	Sub-themes	Quotes
1. Distrust and doubt (n=38)	<ul style="list-style-type: none"> - Additives may be harmful - Synthetic/overdose concerns - Carcinogenic - They may damage the immune system - Unwanted side effects (pain, etc.) 	"Vitamin K injection may contain harmful additives."
2. Perception that IM vitamin K is not necessary (n=11)	<ul style="list-style-type: none"> - The body does not need it - Believing it won't be beneficial 	"I do not think vitamin K would be beneficial."
3. Naturalism and alternative beliefs (n=10)	<ul style="list-style-type: none"> - Preferring natural birth - Trusting alternative/herbal methods 	"I believe complementary and alternative medicine is more effective and has fewer side effects."
4. Beliefs and cultural factors (n=9)	<ul style="list-style-type: none"> - Religious reasons 	"I declined for religious reasons."
5. Lack of knowledge and uncertainty (n=6)	<ul style="list-style-type: none"> - No reason - No idea 	"I do not know."

An analysis of the distribution of themes and subthemes identified to determine the reasons for mothers' refusal of intramuscular (IM) neonatal vitamin K administration revealed that the most common reason was distrust and doubt (n = 38), followed by the perception that IM vitamin K administration was unnecessary (n = 26), naturalistic and alternative beliefs (n=10 faith and cultural factors (n=9), and lack of knowledge and uncertainty (n=6) (Table 6).

When mothers who refused newborn IM vitamin K administration were asked which ingredient in vitamin K concerned them, the most frequently mentioned components were sodium hydroxide and hydrochloric acid (Figure 1).

Table 7. Binary regression analysis of factors associated with newborn IM vitamin K refusal in mothers

	B	S.E.	Sig.	Exp(B)	95% CI for EXP(B)	
					Lower	Upper
Refusing prophylactic eye drops	1.071	0.448	.017	2.91	1.21	7.01
Not using vitamin D	1.050	0.570	.065	2.85	0.93	8.73
Breastfeeding for the first 6 months	-1.765	0.770	.022	2.17	2.03	5.77
Delaying vaccines	-.242	0.447	.588	0.78	0.32	1.88
Concerns about vitamin K content	1.616	0.459	<.001	5.03	2.04	12.38
Not using alternative health practices	-.412	0.508	.417	0.662	0.24	1.79
Tetanus vaccination during pregnancy	-.767	0.450	.088	0.46	0.19	1.12
Folic acid use during pregnancy	.560	0.534	0.295	1.75	0.61	4.98
Not having any screening/tests during pregnancy	1.140	0.757	0.132	3.12	0.70	13.79
Not having the infant monitored and followed up	1.356	0.673	0.044	3.88	1.03	14.51
Not using iron supplements and not having a double screening test during pregnancy	1.034	0.487	0.034	2.81	1.08	7.30
Employment status	-.549	0.427	0.198	0.57	0.25	1.33
New pregnancy	-.583	0.463	0.208	0.55	0.22	1.38

Binary logistic regression analysis revealed that the risk of IM vitamin K refusal was 2.91 times higher (95% CI: 1.21–7.01) among mothers who refused neonatal prophylactic eye drops, 5.03 times higher (95% CI: 2.04–12.38) among those who expressed concern about the content of vitamin K, 2.17 times higher (95% CI: 2.03–5.77) among mothers who exclusively breastfed their babies for the first six months, 3.88 times higher (95% CI: 1.03–14.51) among families who did not have their babies monitored or followed up at a healthcare facility, and 2.81 times higher (95% CI: 1.08–7.30) among women who did not use iron supplements and did not undergo a double screening test during pregnancy ($p < .05$) (Table 7).

DISCUSSION AND CONCLUSIONS

Previous studies have assessed vitamin K refusal using birth or national registry databases, analyzing only the variables available in those records. In contrast, this case-control study examined both the sociodemographic characteristics of mothers and the potential reasons underlying vitamin K refusal. Additionally, mothers' reasons for refusing IM vitamin K administration and their related knowledge were assessed using open-ended questions.

Decisions regarding vitamin K refusal were closely associated with subsequent preventive care and childhood vaccination behaviors. Families who refused IM vitamin K administration were also more likely to reject other preventive measures, including hepatitis B vaccination at birth, gonococcal ophthalmia prophylaxis, pediatric vaccinations, and neonatal screening programs [8, 17, 18].

Consistent with these findings, our study demonstrated a statistically significant relationship between IM vitamin K refusal and the rejection of other preventive interventions.

The literature presents conflicting findings regarding the relationship between caregiver demographics and IM vitamin K refusal. In a retrospective study from the United States, Loyal and Arogona [18] found statistically significant differences between infants who did and did not receive IM vitamin K in terms of maternal age, infant sex, race and ethnicity, and mode of delivery ($p < .05$). Another study reported that mothers who refused IM vitamin K administration were more likely to be of White ethnicity, over 30 years of age, or university graduates [19]. Conversely, some research identified non-White ethnicity as a predictor of vitamin K refusal. A national study from Scotland indicated that maternal and infant demographics did not significantly influence IM vitamin K administration [10].

In the present study, consistent with previous findings from Türkiye, we hypothesized that specific maternal or infant demographic characteristics might be associated with lower rates of IM vitamin K administration. Although univariate analysis revealed significant associations between vitamin K refusal, employment status, and income, these relationships were not significant in the multivariate model.

A detailed analysis of the healthcare institutions providing antenatal care to mothers who refused IM vitamin K administration revealed that approximately one-third received care both from midwives in family health centers and from state hospitals. Home births assisted by midwives were more frequent among mothers who refused vitamin K administration. The higher rate of vitamin K refusal among those receiving midwifery services may be related to the lower level of medical intervention characteristic of the midwifery care model, which emphasizes respect for parental autonomy and prioritizes natural and physiological birth features that may appeal to families favoring minimal intervention [20].

Consistent with our findings, Sahni et al. [16] reported a higher prevalence of vitamin K refusal among midwife-assisted births than physician-assisted births. Planned home births and births in birthing centers were also associated with greater refusal rates compared to hospital births. Such preferences for birth setting and provider type may reflect broader ideological beliefs and concerns about the overmedicalization of childbirth, as well as a preference for natural birthing experiences [16]. Similarly, our study showed that mothers who refused vitamin K prophylaxis were more likely to have planned

home births or deliver in birthing centers, and to give birth vaginally without epidural anesthesia—findings that align closely with Sahni et al. [16].

Several studies have demonstrated a relationship between women’s obstetric characteristics and vitamin K refusal. The rate of IM vitamin K refusal was higher among mothers who delivered vaginally without epidural anesthesia compared to those who delivered vaginally with an epidural or by cesarean section [19, 21]. In addition, IM vitamin K refusal was more common among mothers who delivered preterm infants and whose newborns were admitted to the neonatal intensive care unit (NICU) [16].

Among newborns, IM vitamin K administration has often been refused by parents due to concerns about pain, potential side effects, and the perception that the injection is similar to a vaccine [22]. Loyal et al. [14] identified four key themes influencing IM vitamin K refusal: parents’ perception of risk, preference for “natural” or alternative options, levels of trust or distrust in healthcare systems and professionals, and communication and experiences with healthcare providers. Similarly, Khan et al.[8] found that the likelihood of basic vaccination refusal was 6.45 times higher among families who refused vitamin K prophylaxis compared to those who accepted it.

Ye et al. [23] reported the five most common reasons for parental refusal as: (1) rejection of all routine neonatal medications, vaccines, and preventive practices; (2) preference to delay until consultation with the family physician; (3) preference for oral rather than intramuscular (IM) administration; (4) lack of awareness that vitamin K is not a vaccine; and (5) general distrust of medical interventions. Debate over the IM, oral, and intravenous (IV) routes of vitamin K administration has contributed to parental hesitancy, largely driven by concerns about pain, perceived side effects, and vaccine-like associations. Although some earlier studies suggested a potential link between IM vitamin K and childhood cancer, this association has not been substantiated in subsequent research.

To ensure optimal neonatal care, evidence-based guidelines and clear parental communication regarding vitamin K prophylaxis are essential. In some countries, such as Belgium, families who refuse IM vitamin K are counseled regarding the alternative oral administration route—despite its comparatively higher risk of late-onset vitamin K deficiency bleeding (VKDB) [4, 22].

In this study, the reasons for parental refusal of intramuscular (IM) vitamin K administration were categorized into five main themes: distrust and doubt, the perception that IM vitamin K is unnecessary, natural and alternative beliefs, religious and cultural factors, and lack of knowledge or uncertainty. Among these, distrust and doubt toward IM vitamin K were identified as the most influential reasons for refusal.

The second most common reason was the perception that IM vitamin K administration was unnecessary, while lack of knowledge and uncertainty were also frequently reported. In 2019, the American Academy of Pediatrics (AAP) designated public education on IM vitamin K administration at birth as a public health priority, following an increase in parental refusals that resulted in cases of vitamin K deficiency bleeding (VKDB) [24].

Ye et al.[23] emphasized that insufficient education and counseling for hesitant parents contributed to refusal behaviors and suggested quality improvement initiatives to reduce vitamin K refusal through evidence-based and consistent counseling. In their study, 31% of families who received counseling changed their decision and consented to vitamin K administration. However, families receiving midwife-led care were 2.7 times more likely to continue refusing vitamin K compared with those receiving care from a medical team, and this difference was statistically significant.

Concerns regarding the content of vitamin K formulations were also identified as a notable source of anxiety among mothers. Previous studies have shown that some parents believe vitamin K preparations contain synthetic or toxic substances [19] and that perceived harmful effects outweigh the potential benefits [14, 25]. These findings suggest that mothers' apprehensions are often generalized concerns about the overall formulation rather than fears related to any specific ingredient.

This study has several notable strengths. Its case-control design enabled the investigation of the relatively low prevalence of newborn intramuscular (IM) vitamin K refusal. This design is recognized as an effective approach for identifying potential risk factors associated with IM vitamin K administration. Data were obtained directly from mothers through both healthcare professionals and social media platforms, providing a population-based perspective and enhancing the diversity of participants.

However, certain limitations should be acknowledged. The use of a snowball sampling method may have introduced selection and volunteer bias, as there was no access to national birth records, and reaching families who refused vitamin K administration was challenging. Additionally, the study relied on self-reported data collected via questionnaires, which may have been influenced by recall bias, non-response bias, or social desirability bias.

In conclusion, maternal refusal of IM vitamin K administration was found to be associated with the refusal of other preventive public health interventions, including pediatric vaccinations and childhood screenings. Moreover, the increasing preference for natural and alternative treatment approaches emerged as a significant factor influencing vitamin K refusal.

It is recommended that discussions about vitamin K and vaccine refusal be integrated into antenatal care and infant-child follow-up visits. The key reasons for parental refusal identified in this study—distrust and doubt, perceived lack of necessity, natural and alternative beliefs, religious and cultural factors, and lack of knowledge or uncertainty—underscore the need for targeted interventions.

To reduce national rates of vitamin K refusal, it is crucial to implement evidence-based education and counseling for expectant parents starting in the prenatal period. The integration of motivational interviewing techniques to address parental hesitancy may further enhance acceptance. Future research should also focus on developing alternative vitamin K formulations that are perceived as more acceptable and trustworthy by parents.

Declarations

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Author Contribution

All authors: conceptualization, methodology, writing original draft, reviewing the manuscript. SY: analysis and supervision. TK: correction of final draft.

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References

1. Araki S, Shirahata A (2020) Vitamin K Deficiency Bleeding in Infancy. *Nutrients* 12:780. <https://doi.org/10.3390/nu12030780>
2. Lammers S, Iovino NA, Pusateri A et al (2025) Maternal and Neonatal Hemorrhage From Vitamin K Deficiency in the Setting of Crohn Disease in Pregnancy. *Obstet Gynecol* 145:e127. <https://doi.org/10.1097/AOG.0000000000005870>
3. American Academy of Pediatrics (1961) Report on Committee on Nutrition: Vitamin K Compounds and the Water-Soluble Analogues. *Pediatrics* 28:501–507. <https://doi.org/10.1542/peds.28.3.501>
4. Turkish Neonatology Society (2021) Guide To Childbirth Room Management 2021 Update. https://neonatology.org.tr/uploads/content/tan%C4%B1-tedavi/6_min.pdf. Accessed 15 Dec 2025
5. Scientific Committee of the Ministry of Health (2021) Vitamin K Administration in Newborns. https://hsgm.saglik.gov.tr/depo/Mevzuat/Genelgeler/2021-11_sayili_Yenidoganlarda_K_Vitamini_Uygulamasi_Genelgesi.pdf. Accessed 14 Jan 2026
6. Loyal J, Shapiro ED (2020) Refusal of Intramuscular Vitamin K by Parents of Newborns: A Review. *Hosp Pediatr* 10:286–294. <https://doi.org/10.1542/hpeds.2019-0228>
7. Azar JM, Lambert R, Maffei FA, Thomas TA (2024) Late-onset vitamin K deficiency presenting as haemorrhagic shock and severe multi-system organ failure. *BMJ Case Rep CP* 17:e261126. <https://doi.org/10.1136/bcr-2024-261126>
8. Khan TM, Mubarak N, Suleimen A et al (2022) Parents' refusal to vitamin-K supplementation among neonates and its association with vaccine refusal: A systematic review and meta-analysis. *J Pak Med Assoc* 72:2251–2258. <https://doi.org/10.47391/JPMA.3914>
9. George CLS, Sidebottom AC, Evans MD et al (2025) Characterizing Vitamin K Refusal in Term Hospital-Born Infants in Minnesota, 2015–2019. *Hosp Pediatr* 15:149–157. <https://doi.org/10.1542/hpeds.2024-008002>

10. Brunton S, Fenton L, Hardelid P, Williams TC (2024) Uptake of intra-muscular vitamin K administration after birth: A national cohort study. *Acta Paediatr* 113:1264–1269. <https://doi.org/10.1111/apa.17168>
11. Wong M, Ucas J, Hong T (2019) Vitamin K Refusal and Outcomes of Routine Medical Counselling. *J Paediatr Child Health* 55:130–130. https://doi.org/10.1111/jpc.14407_40
12. Unal E, Ozsoylu S, Bayram A et al (2014) Intracranial hemorrhage in infants as a serious, and preventable consequence of late form of vitamin K deficiency: a selfie picture of Turkey, strategies for tomorrow. *Childs Nerv Syst* 30:1375–1382. <https://doi.org/10.1007/s00381-014-2419-2>
13. Marcewicz LH, Clayton J, Maenner M et al (2017) Parental Refusal of Vitamin K and Neonatal Preventive Services: A Need for Surveillance. *Matern Child Health J* 21:1079–1084. <https://doi.org/10.1007/s10995-016-2205-8>
14. Loyal J, Weiss TR, Cheng JH et al (2019) Refusal of Vitamin K by Parents of Newborns: A Qualitative Study. *Acad Pediatr* 19:793–800. <https://doi.org/10.1016/j.acap.2019.04.003>
15. Miller H, Kerruish N, Broadbent RS et al (2016) Why do parents decline newborn intramuscular vitamin K prophylaxis? *J Med Ethics* 42:643–648. <https://doi.org/10.1136/medethics-2016-103534>
16. Sahni V, Lai FY, MacDonald SE (2014) Neonatal Vitamin K Refusal and Nonimmunization. *Pediatrics* 134:497–503. <https://doi.org/10.1542/peds.2014-1092>
17. Yörük S, Güler D Factors associated with pediatric vaccine hesitancy of parents: a cross-sectional study in Turkey. *Hum Vaccin Immunother* 17:4505–4511. <https://doi.org/10.1080/21645515.2021.1953348>
18. Loyal J, Aragona E (2021) Trends in and Documentation of Refusal of Common Routine Newborn Interventions: 2013–2019. *Hosp Pediatr* 11:962–967. <https://doi.org/10.1542/hpeds.2021-005977>
19. Hamrick HJ, Gable EK, Freeman EH et al (2016) Reasons for Refusal of Newborn Vitamin K Prophylaxis: Implications for Management and Education. *Hosp Pediatr* 6:15–21. <https://doi.org/10.1542/hpeds.2015-0095>
20. Loyal J, Danziger P, Wood KE (2022) Midwives' Perspectives about Vitamin K Prophylaxis Against Vitamin K Deficiency Bleeding of the Newborn. *Matern Child Health J* 26:1641–1648. <https://doi.org/10.1007/s10995-022-03423-4>
21. Loyal J, Taylor JA, Phillipi CA et al (2018) Factors Associated With Refusal of Intramuscular Vitamin K in Normal Newborns. *Pediatrics* 142:e20173743. <https://doi.org/10.1542/peds.2017-3743>
22. Fiesack S, Smits A, Rayyan M et al (2021) Belgian Consensus Recommendations to Prevent Vitamin K Deficiency Bleeding in the Term and Preterm Infant. *Nutrients* 13. <https://doi.org/10.3390/nu13114109>
23. Ye GX, LaRiviere A, Kundlas AK et al (2024) Newborn IM Vitamin K Refusal Rates and Parental Reasoning in an Academic Well Baby Nursery. *Blood* 144:7551. <https://doi.org/10.1182/blood-2024-198533>
24. American Academy of Pediatrics Elimination of non-medical vaccine exemptions ranked top priority at Annual Leadership Forum. <https://publications.aap.org/aapnews/news/8970/Elimination-of-non->

medical-vaccine-exemptions. Accessed 14 Jan 2026

25. Loyal J, Taylor JA, Phillipi CA et al (2017) Refusal of Vitamin K by Parents of Newborns: A Survey of the Better Outcomes Through Research for Newborns Network. *Acad Pediatr* 17:368–373. <https://doi.org/10.1016/j.acap.2016.10.012>

Figures

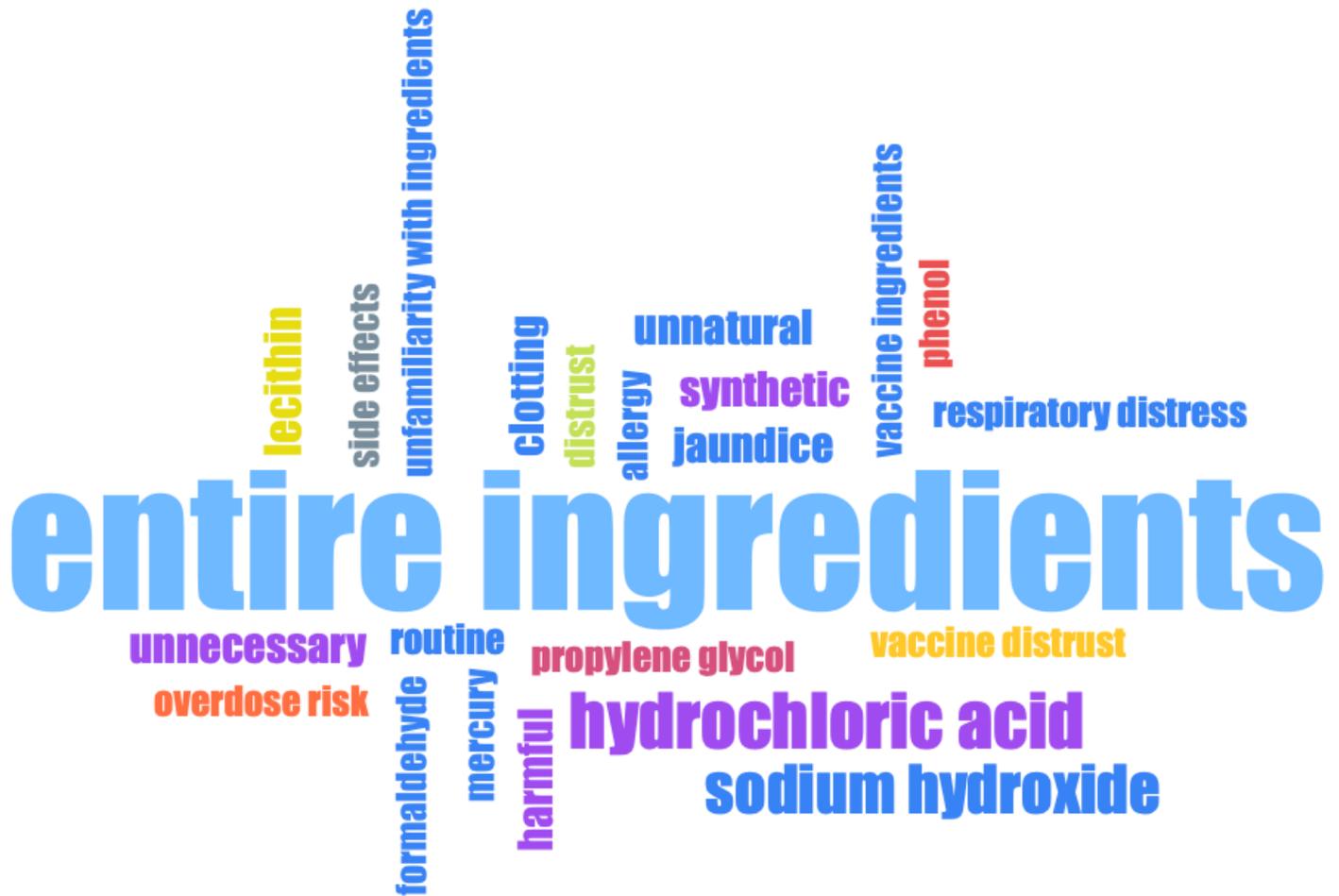


Figure 1

Factors that worry mothers about vitamin K